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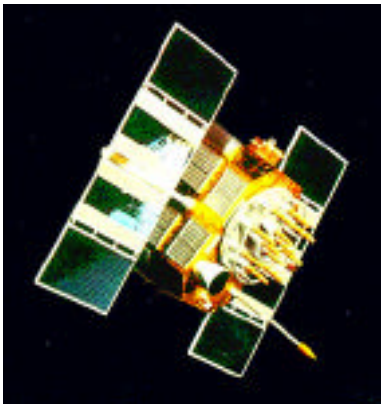
Global Positioning Systems Now Synchronize SGP Instruments

To synchronize the clocks on the instruments deployed across the SGP CART site's 55,000 square miles, economical global positioning system (GPS) receivers have been installed at all 24 extended facility locations. Recording the precise time of data collection is crucial for generating meaningful, accurate research results.

The GPS is a navigational and positioning tool that uses signals broadcast from satellites orbiting 12,000 miles above Earth's surface. Each of the 24 GPS satellites circles the planet twice daily. Each satellite is equipped with a highly accurate clock and continuously transmits time-synchronized signals. A receiver on the ground can determine its distance from a GPS satellite by monitoring the satellite's radio signals. When the receiver locates its position relative to at least four satellites, the receiver can mathematically determine its exact position on Earth, within approximately 50 feet. Precision timing is very important to the function of GPS, because knowing the exact amount of time the signal requires to travel from the satellite to the ground is critical for determining a receiver's position.

Employing GPS technology will assure the accuracy of the measurement times attached to each bit of data gathered at the SGP site. The ARM Program currently participates in the SuomiNet project (http://www.suominet.ucar.edu/), which uses GPS technology to measure atmospheric water vapor.



A GPS satellite in orbit (NASA image).

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Technical Contact: James C. Liljegren
Phone: 630-252-9540
Email: jcliljegren@anl.gov
Editor: Donna J. Holdridge

Spectral Liquid and Ice Comparison Completed in October

The Spectral Liquid and Ice Comparison intensive operational period (IOP) in October 2003 investigated new ways to measure liquid and frozen water within clouds. The new method tested in the IOP involves measurement of scattered sunlight in the near-infrared light spectrum. The scientists participating in the IOP hope to show that the new technique will increase confidence in measurements already made by SGP instrumentation and will also improve measurements when current instruments meet their physical limitations. Analysis of the IOP results is in progress. Online links to descriptions of ARM IOPs are at http://www.db.arm.gov/cgi-bin/IOP/iops.pl.

New Surface Reference System Installed at SGP

A new Surface Reference System (SRS) for use with the balloon-borne sounding system has been tested and installed at the central facility. Before any weather balloon is launched, measurements from its radiosonde (instrument package) must verified by comparison with current surface weather readings that are known to be reliable and accurate. The SRS contains probes that measure both temperature and relative humidity. Before a balloon launch, ARM scientists place the radiosonde in the SRS enclosure, allow the instrument package to equalize with its surroundings, and record temperature and relative humidity readings from both the SRS probes and the radiosonde sensors. These data can be used after the balloon flight to make any adjustments needed to compensate for differences between the radiosonde and reference readings.

The new SRS was initially installed at the guest instrument facility for testing during the recent AWEX-G IOP (see November 2003 *ARM Facilities Newsletter*). The SRS was moved to the central instrument area after the IOP ended. The SRS replaces an existing temperature and chilled-mirror preflight reference system that has been providing air temperature and relative humidity readings.

Radiosondes directly measure temperature, relative humidity, wind speed and direction, and atmospheric pressure. Additional quantities derived from the measured data include altitude, dew point, ascent rate, latitude and longitude of the radiosonde, and directional wind components.

More information about the guest instrument facility and the central instrument area is at these online locations:

- Guest instrument facility: http://www.arm.gov/docs/sites/sgp/guest/sgp_guest_facility.html
- Central instrument area: http://www.arm.gov/docs/sites/sgp/images/maps/sgp_cart_cf.gif

Correction

In last month's newsletter (November 2003), Figure 2 incorrectly identified the person preparing to launch a Vaisala RS92 radiosonde as Barry Lesht. The photo is actually of Holger Voemel, and the device is his frost-point hygrometer. We regret the error.